THE JOURNAL

OF THE

VOL. 1 OCTOBER, 1915 No. 1

LIBRARY OF CONGRESS
NOV 8 1915
PUBLIC DOCUMENTS DIVISION

President . . . . . H. E. WEAVER
Larabee Mlg. Co., Hutchinson, Kansas

Vice Pres. and Business Mgr. . . A. P. BASSE
105 W. 36th St., Kansas City, Mo.

Sec. and Treas. . . . P. M. PATTERSON
Wm. Kelly Mlg. Co., Hutchinson, Kansas

Editor . . . . . R. W. MITCHELL
Kansas Mlg. Co., Wichita, Kansas

Address all articles for publication to

R. W. MITCHELL Kansas Milling Co. WICHITA, KANSAS

V -4 1915

©Cl.B342514

THE

JOURNAL

of the

AMERICAN ASSOCIATION

of

CEREAL CHEMISTS

PUBLISHED *by the* AMERICAN ASSOCIATION *of* CEREAL CHEMISTS

Vol. 1 OCTOBER, 1915 No. 1

Entered as Second Class Matter at the Post Office at Wichita, Kansas.
The material in the publication is covered by copyright. Republication is permitted if credit is given to this Journal.

PRESIDENT'S ADDRESS

Gentlemen: I thank you for the honor conferred on me by selecting me to be the first President of our organization. You well know that this movement is a thing that is of great interest to me and I assure you that I will bend every effort to the good of the cause.

We are here this morning because our experiences are all of about the same character and that means that each one present very clearly sees the need of some action on the part of the cereal chemists to systematize the methods in common use and the manner of reporting the conclusions reached. The need of more uniform methods in the cereal laboratory and more particularly in the milling and baking laboratories is pressing to say the least. There are methods and methods, and while the methods are often all right and the results likewise, it often happens that special conditions may make good and accurate work show up in a bad light by comparison. Because of this we find ourselves wishing that the other fellow did his work just the way that we do and would report his results in the same symbols. This brother reports his loaf volume in cubic inches and this one reports in percentage: you say, "It is all the same in Dutch", well we want to make it all the same in English. So that is what we are here for and as soon as we feel competent and prepared to undertake the job we will attempt to decide on the best procedure in each of the many cases that come up.

Our work at this meeting will of course be rather of a preparatory nature and will be well done if it serves to guide the efforts of each of us in lines that will be productive of results at our next meeting. That being the case, and in view of the fact that I probably am no better posted on the conditions that exist than you who sit here, I will declare the meeting open for an informal discussion of the work that is before us.

REPORT OF SECRETARY

Coates House, Kansas City, Mo.,
May 8, 1915.

The chemists present were:

C. F. Buck, Enterprise, Kan.

A. W. Estabrook, Estabrook Laboratories, Kansas City, Mo.

J. M. Hogan, Kansas Flour Mills Co., Kansas City, Kan.

A. A. Jones, El Reno Milling Co. & Canadian Mill & Elevator Co., El Reno, Ok.

R. A. Lusk, Rea Patterson Milling Co., Coffeyville, Kan.

R. W. Mitchell, Kansas Milling Co., Wichita, Kan.

P. M. Patterson, Wm. Kelly Milling Co., Monarch Milling Co., Hutchinson Milling Co., Hutchinson Kan.

C. J. Patterson, The Ismert-Hincke Milling Co., Kansas City, Kan.

A. R. Sasse, Southwestern Milling Co., Kansas City, Kan.

H. E. Weaver, The Larabee Milling Co., Hutchinson, Kan.

E. G. Wahlin, Oklahoma Laboratories, Oklahoma City, Okla.

Mr. Weaver was selected to be the chairman of the meeting, and at 10 o'clock called the members to order.

The first matter to be considered was that of a constitution. The outline of one had been prepared by Messrs. C. J. Patterson, P. M. Patterson, A. R. Sasse and R. W. Mitchell. From this tentative form the constitution was constructed and adopted article by article. Each article was considered separately and altered and reconstructed to meet the approval of the members. The final vote was taken at 12 o'clock noon.

The next matter was the election of officers. Those elected were:

President, H. E. Weaver.
Vice-Pres., A. R. Sasse.
Sec. and Treas., P. M. Patterson.
Chairman of Executive Committee, C. J. Patterson.
Editor, R. W. Mitchell.

The executive committee appointed consists of the following members:

C. J. Patterson, Chairman.
A. A. Jones.
J. M. Hogan.
R. A. Lusk.

Following the election of officers the meeting adjourned for lunch.

Afternoon Session

Meeting called to order at 2:30 o'clock.

The meeting was thrown open for a short time for a general discussion of methods after which the president put up for consideration special subjects. The first method discussed was the determination of ash. Opinion was practically unanimous in favor of the simple ashing method as provided in the official methods of the A. O. A. C.

Time was given to the consideration of the following tests and the action taken in each case is shown below. No attempt was made to adopt methods to be official but in several cases the opinions were so concordent that it would be only a matter of framing the provisions. Where a difference of opinions appeared President Weaver appointed investigation committees to do special work to be reported at the next meeting. The following committees were appointed:

Acidity—R. A. Lusk, A. R. Sasse.

Relation of Quality of Gluten to Bread—C. J. Patterson, A. A. Jones.

Moisture Determination — E. G. Wahlin, R. W. Mitchell.

The action taken on the subjects considered is as follows:

Ash—Unanimously agreed that the official method of the A. O. A. C. gives the most satisfactory results.

Moisture—Drying at 101 to 105 degrees C. until the sample ceases to lose weight. The form of drying dish was left an open question.

Gluten in Flour—To be determined by either the 'Kjeldahl,'' ''Gunning,'' or ''Kjeldahl Gunning Arnold'' method. The calculation to be N. X. 5.7.

Color—No decision was reached on the point of color grading.

Measure of Volume—There being strong arguments in favor of both the percentage and the cubical methods of reporting, no decision was reached.

The meeting adjourned at 6:30 to meet again at such time and place as the executive committee may decide on.

Signed P. M. PATTERSON,
Secretary.

CONSTITUTION OF THE AMERICAN ASSOCIATION OF CEREAL CHEMISTS

Purpose

The purpose of this association is to reach by means of research and discussion, agreement in the methods of analysis necessary in the cereal laboratory. The object to be accomplished is the establishment of standard methods of procedure in the analysis of cereal products.

Membership

Section 1. The membership shall be restricted to those male persons having had at least two years of chemical training in some accredited school, and practical experience in cereal chemistry.

Sec. 2. All applications for membership must be passed upon by a body known as the executive committee, to be selected as hereinafter provided.

Sec. 3. Honorary members may be elected by a three-fourths majority vote of the members present at a regular meeting. The name of the candidate to be entered by an active member of the association.

Sec. 4. Application for membership must be made in writing, and shall be indorsed by at least three active members of the association.

Sec. 5. Election of members is to be by ballot at a regular meeting, a two-thirds majority vote being necessary for acceptance.

Officers

Section 1. The officers of this association shall be: President, Vice-president, Secretary and Treasurer, Chairman of the Executive Committee, and the Editor.

Sec. 2. Election of officers shall be by ballot at general meetings. There must be at least three nominations of active members for each office to make the election valid.

Sec. 3. Duties of officers:

a. The President shall preside at all meetings and be the official head of the association.

b. The Vice President shall preside at all meetings in the absence of the President, and assist him in the duties of the office. He shall also act as business manager for all publications of the association.

c. The Secretary and Treasurer shall keep a record of the minutes of the meetings, send out notices to the members and handle all the correspondence of the association. He shall collect all fees and moneys due the association, and pay all bills; such bills to be countersigned by the chairman of the Executive Committee.

d. The President and the Chairman of the Executive Committee shall jointly select three active members of the association to act as an Executive Committee.

e. It shall be the duty of this committee to investigate the qualifications of all applicants for membership, and to report to the association in general session. The commitee shall co-operate with the president in carrying on the business of the association between meetings. It shall be the privilege of the president to vote in the meetings of this committee.

f. In the absence of both the President and the Vice President it shall be the duty of the Chairman of the Executive Committee to occupy the chair.

g. The Editor shall prepare the material for the official organ of the association and turn it over to the business manager for publication.

Fees

Section 1. The application fee shall be five dollars. The fee must ac-

company the application; the fee to be returned in case the application is rejected or the applicant fails of election.

Sec. 2. The dues in this association shall be two dollars ($2.00) per annum. This shall include subscription to all publications of the association.

Sec. 3.—Honorary members shall be exempt from all dues and fees.

Sec. 4.—Assessments may be levied when the current expenses of the association make this necessary. The Treasurer with the consent of the Executive Committee may levy said assessment.

Sec. 5—Failure on the part of any member to pay his dues or assessments shall be regarded as a resignation.

Sec. 6.—All annual dues must be paid in advance, the membership card constituting a receipt for the same.

Elections and Meetings

Sec. 1.—Meetings shall be held semi-annually at such time and place as may be determined by the Executive Committee.

Sec. 2.—In all general meetings an attendance of at least one third of the active members of the association shall constitute a quorum.

Sec. 3.—The officers shall be elected to serve for a term of one year, or, until a successor is elected.

Sec. 4.—Honorary members shall have the privilege of attending all general meetings and the privilege of the floor but shall have no vote.

Amendments

Amendments to this constitution may be made at any general meeting; a two third majority vote of the members present being necessary to carry.

THE REASON

On the 8th of May, 1915, in Kansas City, Mo., a few chemists that were interested in cereal work met to form an organization for the advancement of the science as applied to cereal analysis. They were all operators in laboratories in which the work was principally the control of flour milling operations.

In the course of their experience each one had been faced with the question, "Why can't you chemists agree in your reports?" It must be acknowledged that there are grounds for such queries, and that, tho they are explanable to the satisfaction of the chemists it does not eliminate the fact that it lowers the value of a chemical analysis in the eyes of the baker, jobber, or miller.

Each member present was there because he felt the need of associating with other chemists interested in the same line of work, with whom he could exchange ideas and discuss the various methods as practiced by others. All realized that, if by means of discussion and investigation the best practicable method of procedure for each determination could be established, then standard methods could be outlined and with that done uniformity of results would follow.

This then is the object of the association which has taken onto itself the title of "THE AMERICAN ASSOCIATION OF CEREAL CHEMISTS." To carefully consider methods of procedure and practice in cereal analysis by means of research and open discussion, and to draw conclusions which are representative of the convictions of the operators who are members. It is the desire to adopt methods which are as free of any scientific objections as possible but at the same time lend themselves to the best advantage under the conditions that exist in the ordinary "control" or "commercial" laboratory. It is realized that there are many objections to be met each time that a standard method is adopted. There will be special reasons why certain points in any meth-

od should be done slightly differently by different operators. All points that have a bearing on the results gotten by any method must be carefully considered and then the method that is the most scientifically exact and at the same time practicable, selected as the standard.

Every earnest chemist who is seeking to give his employer value received, will see in this movement an opportunity to increase his efficiency by joining with the members and giving and receiving in the efforts to achieve more uniform results. Flour and cereal chemistry has in the past never seen any concerted efforts put forth for its benefit and now when the start has been made it would be a great boon to all if the interested ones would come forward and join in a united membership in the interest of a worthy cause.

It is the earnest desire that millers and mill owners will understand the object of this organization. STANDARDS, is a word that has recently come into bad repute with many millers. We hope that such persons will not let the word deter them from reading of the purpose and the ends to be accomplished by our body.

There is no intention of comparing milling methods or telling others the little things about our particular mill that we think puts it ahead of the other fellow, we will leave that to the millers themselves. The fact is that there are in almost all cases several ways to get the analytical data that makes the laboratory valuable. Because of the differing methods there is a greater liability of apparent discepencies in the work of different operators working under different conditions. Then again there is a grievous lack of system in the manner of reporting the data. For instance, three laboratories might get the same loaf volume and yet their reports would be utterly dissimilar, due to the fact the one reported in percentage, the second in cubic inches and the third in cubic centimeters. Uniformity in this matter will only come, thru some such agency as our organization proposes to be.

Another thing; we wish to assure the mill owners that there is nothing of the character of a "UNION" in this movement. This is a movement for the good of the profession in that it will increase the efficiency of the individual and in so doing increase his value to the employer. A wage scale is the last thing that the ambitious operator would care to have to contend with.

THE RELATION OF ASH AND GLUTEN IN WHEAT FLOUR

Expressing the percentage of ash in flour is in reality giving the percentage of mineral matter contained therein.

The ash is composed principally of the following chemical compounds Silica, allumina, ferric oxide, potash, lime, magnesia, phosphoric acid, sulphur trioxide, zinc oxide and some times a little soda and a trace of chlorin. The potash, lime and phosphoric acid form about ninety (90) per cent of the total ash. These salts are needed for the upbuilding of the bone and tissue of the human body. The presence of these salts lend stability to the gluten, and in the case of the phosphoric acid and probably also the potash acts as food for the yeast during fermentation.

Considering these facts, some have claimed the higher the ash, the more valuable the flour is as a food, and the better the fermentation of the dough. It is true the body should not be compelled to depend upon the salts contained in white flour alone; nor does it. The value of the salts contained in the ash as a yeast food is undoubted, but large quantities are not necessary to perform this function. Good healthy fermentation is obtained every day using

flour with an ash content as low as .37 of one per cent.

The ash is, of course, contained in wheat, and, contrary to the popular belief, is contained throughout the wheat berry and not all around the bran coating. The wheat berry is divided into three parts: the bran coating, the germ and the endosperm, each with its own peculiar function. The bran coating is for the protection of the berry; the germ is the embryo wheat plant, and its function is reproduction, and the endosperm is the part stored with starch and gluten and is for the purpose of feeding the young plant until it can take root and take its nourishment from the soil. The endosperm is separated from the bran and germ during the process of milling, and is used for flour. Ash is contained in all these parts; the subjoined table of analysis of mill streams will give some indication as to this distribution, and also the baking qualities of the flour, and the distribution of the gluten:

	1st Crush Coarse	2nd Crush Coarse	3rd Crush Coarse	4th Crush Coarse	5th Crush Coarse	6th Crush Coarse	7th Crush Coarse
Ash	.33	.34	.38	.39	.45	.54	.72
Gluten	11.55	11.73	12.07	12.07	12.68	13.07	13.21
Color of Bread	.99	.99	100.	100.	.98	.97	.96
Vol of Loaf	154.	152.	160.	160.	170.	162.	146.
Bloom	Ex.	Ex.	Ex.	Ex.	Good	Fair	Poor

	1st Crush Fine	2nd Crush Fine	3rd Crush Fine	4th Crush Fine	5th Crush Fine	6th Crush Fine	7th Crush Fine
Ash	.35	.37	.40	.45	.44	.61	.60
Gluten	11.81	11.81	11.81	12.55	11.98	12.42	14.21
Color of Bread	100.	100.	.99	.98	.98	.97	.96
Vol of Loaf	158.	154.	152.	172.	160.	150.	156.
Bloom	Ex.	Ex.	Ex.	Good	Good	Fair	Fair

	1st Break	2nd Break	3rd Break	4th Break	5th Break No. 1	5th Break No. 2
Ash	.54	.41	.48	.64	.73	.96
Gluten	10.32	10.42	13.42	15.21	16.21	16.88
Color of Bread	.96	.98	.99	.90	.50	.50
Vol of Loaf	156.	156.	178.	140.	.96	.85
Bloom	Poor	Fair	Good	Poor	Poor	Poor

	1st Sizings	2nd Sizings	3rd Sizings
Ash	.44	.42	.58
Gluten	11.91	11.37	11.55
Color of Bread	.99	100.	.98
Vol. of Loaf	152.	152.	148.
Bloom	Fair	Good	Poor

	Germ Tail	Coarse Tail	Fine Tail
Ash	.67	.92	.95
Gluten	12.02	13.30	16.08
Color of Bread	.94	.87	.83
Vol of Bread	158.	148.	144.
Bloom	Poor	Poor	Poor

	1st Finish No. 1	1st Finish No. 2	2nd Finish No. 1	2nd Finish No. 2	3rd Finish
Ash	.92	.89	.63	.68	.75
Gluten	15.60	14.50	15.00	12.60	13.30
Color of Bread	.85	.85	.88	.87	.86
Vol. of Loaf	140.	144.	150.	148.	146.
Bloom	Poor	Poor	Poor	Poor	Poor

	Bran & Shorts No. 1	Duster No. 2
Ash	.82	.68
Gluten	14.00	12.60
Color of Bread	.86	.87
Vol. of Loaf	144.	148.
Bloom	Poor	Poor

	Germ	Shorts	Bran	Wheat
Ash	7.82	2.21	6.26	1.85
Gluten	---	---	---	---
Color of Bread	---	---	---	---
Vol of Loaf	---	---	---	---
Bloom	---	---	---	---

About 80% of all the flour is found in the crushes or middlings, which is composed of the heart of the berry. A glance at the above table will show that the greater ash is contained near the bran coat. A little study of the crushes shows that the best bread is obtained from the streams lowest in ash, also the gluten increases in the crushes, as the ash increases. It is worth noticing also that the fine crush carries just a little more ash than the coarse. In the break flours, the relation between gluten and ash disappears. From the analysis of mill streams, one comes to the conclusion that the best and purest flour contains the least ash; this is true provided the streams are properly handled.

What is the value of the ash test? To the baker it is an indication to the grade of flour, but is not infallible, and should always be checked by other tests. It is probably a true indication nine times out of ten, but poor milling has more effect upon the ash content of flour than the per cent of ash contained in the wheat. Wheat which lacks the proper conditioning in the way of tempering and heating is sure to make poor flour with a high ash content. While there is no doubt the best grade of any one mill will show a lower ash content than the lower grades of this particular mill, it may be possible that some other mill through superior milling is making a better flour with as low or lower ash content, although the per cent patent is longer.

For example: One mill makes a patent with .48% ash, and another mill makes a straight with the same percentage. The straight in all probability is the better flour, because it is clear and pure, its ash belongs there, but the patent contains from .06 to .10% of dirt and offal due to poor milling.

The per cent of ash is a good indication to the grade of flour, but is better checked by other tests. The baker who buys by the ash test alone should take care to put a very low amount as his standard.

To the miller the ash test is of far greater importance. It is the best indication as to the uniform action of the mill day after day. As long as the ash content runs uniform, there is little doubt that the best flour is being made that the wheat mixture will permit. As soon as the ash runs high, it shows something is wrong, and a quick investigation is in order; then an ash test of the various streams is made and the trouble located. Sometimes the trouble can be traced directly to some machine as in the following case, being an investigation after a slight increase in the ash content of the patent flour; the clear remaining normal.

Examination of Purifiers

1st Mids	.77
1st Mids—1st Cut	.39
1st Mids—2nd Cut	.46
1st Mids—3rd Cut	.71
2nd Mids	.54
2nd Mids—1st Cut	.41
2nd Mids—2nd Cut	.38
2nd Mids—3rd Cut	.43
2nd Mids—4th Cut	.94
3rd Mids	.42
3rd Mids—1st Cut	.41
3rd Mids—2nd Cut	.45
3rd Mids—3rd Cut	.60

The last two tests show poor working purifiers; the test located the source of the trouble and enabled the proper corrections to be made. As the rest of the purifiers were working nicely, the work done on them will not be shown here. For the miller, the ash test is a great aid toward keeping the flour uniform and locating the source of trouble.

There are several ways of determining the percentage of ash in flour. All involve the driving off of all matter excepting the mineral matter, by heat. The one with which the writer has had the most success in the "Muffle Furnace" method. This consists of heating a weighed quantity of flour in a muffle furnace, at a low red heat, until it ceases to lose weight. When complete, the ash will be light and lose, free from carbon spots, and range in color from white to dark grey; depending upon the grade of the flour, the lower grades of flour being the darker in color. This test takes from six to ten hours in time.

The calcium acetate method is much quicker. This method consists in adding to a given quantity of flour a certain amount of calcium acetate solution. The weight of calcium oxide per c c of solution is of course previously determined. The solution of calcium acetate is mixed thoroughly with the flour in a platinum crucible heated until dry over a flame then finished in the muffle furnace. The weight of the calcium oxide added is, of course, deducted from the final weighing.

This method usually gives low results, although there is danger that the solution made up will not remain uniform, and the test made with the last of the solution will give high results. An ash which has been over heated and become fused, will be greatly benefited by the addition of a little nitric acid. During fusing the phosphates are reduced to metaphosphates, the addition of nitric acid tends to oxidize the metaphosphates to their former condition and restore the weight lost in the reduction. However, it seldom pays to work with a fused ash and the best plan is to discard it entirely.

The writer has made some investigations to determine if high gluten flour contain more ash than low gluten flours, with the following results. The flours here given are all milled from Kansas hard wheat, and are supposed to be of the same grade:

Sample No.	%Gluten	%Ash
No. 1	11.81	.36
No. 2	11.63	.35
No. 3	12.68	.35
No. 4	11.21	.38
No. 5	13.21	.37
No. 6	12.71	.42
No. 7	12.31	.40
No. 8	12.62	.37
No. 9	11.99	.42
No. 10	10.82	.42

There is nothing here to indicate that a high ash follows a high gluten. The conditioning of the wheat and the milling are in all probability responsible for the variation in ash, and not the strength of the wheat mix used.

EFFECT OF CHLORINE AND OXIDES OF NITROGEN ON THE FAT OF WHEAT

The following experiments were conducted for the purpose of determining the effect on the Iodine value of wheat fat as caused by the use of Chlorine and the oxides of Nitrogen as flour bleaching agents.

A clear flour was chosen because of the fat content. The same flour

was used in one series as it could be obtained in the natural state and also bleached with chlorine and the oxides of Nitrogen, other samples were taken at random merely as checks.

The following is a list of samples used for these tests:

No. 1. Unbleached*.

No. 2. Chlorine bleached, ½-oz. per bbl.

No. 3. Chlorine bleached*, 1½-oz, per bbl.

No. 4. Alsop bleached, normal*.

No. 5. Alsop bleached, heavy.

No. 6. Unbleached, but rancid from age.

Samples marked with an asterisk* are the same flour.

Seventy-five grams of the flour were extracted with ether for 24 hours, and the ether evaporated to obtain the fat, the Iodine value of which was determined as given in Bulletin 107 of the Bureau of Chemistry, U. S. A., using the Hanus Iodine solution.

Iodine solution; 13.2 grams of Iodine, Merck's reagent were dissolved in 1000c. c glacial Acetic acid, C. P. and Bromine added to double the halogen content, as determined by titration. The Iodine was dissolved by gentle heating and the Bromine added after the solution was cold.

Sodium Thiosulfate, N-10, was used in the titration, standardized with Potassium bichromate, N-10.

Potassium iodide solution; 150 grams of KI. were dissolved in distilled water and dilluted with distilled water to I liter.

About 0.4 gram of the fat was accurately weighed and dissolved in 10 c. c. of chloroform; after complete solution had taken place 25 c. c. of the Iodine solution were added and allowed to stand, with frequent shaking, for thirty minutes, and then titrated with the Sodium thiosulfate solution.

For titration, 10 c. c. of the K. I. solution were added with 100 c. c. of distilled water, and then the Sodium thiosulfate solution added very slowly.

When the solution has become a very pale yellow, there must be added a few drops of starch paste for indicator and the titration continued drop by drop until the solution has lost its blue color. After shaking briskly the solution was allowed to stand for a few minutes to allow any Iodine in the chloroform to become liberated, and then a drop or so more of the thiosulfate added if necessary.

A wide mouthed, glass stoppered, bottle should be used for the solution and titration.

The following data from the experiments, while not showing any effect on the baking qualities of the flours; nor any definite ratio between the amounts of the various gases used in bleaching, and the Iodine value; does show however the decrease in Iodine absorption power caused by Chlorine bleaching, and experiments along this same line of work may some day lead to a simple method of determining the amount of this gas that a sample flour has received in bleaching, except in the case of very old samples.

Sample	1st Test	2nd Test	3rd Test
No. 1* unbleached	99.8	99.5	100.3
No. 2 chlorine	91.2	89.1	91.3
No. 3*chlorine	82.5	83.9	82.0
No. 4* Alsop, normal	99.5	97.4	99.7
No. 5 Alsop, heavy	98.8	99.4	99.3
No. 6 unbl., rancid	86.3	85.7	---

P. M. PATTERSON.

DRIED GLUTEN BECOMING OBSOLETE

July 30, 1915.

Having had a large amount of experience with dried gluten, and having failed to obtain results that could have been considered in the most remote way as being satisfac-

tory, I feel justified in issuing the following article on DRIED GLUTEN.

The complete extinction of the mechanical method for washing and drying gluten, in a chemical laboratory, is only a matter of time. The idea of circulating such a determination for other people to check, is too absurd for consideration.

Here are some conditions that cause large variations in obtaining dried gluten.

(a) The operator, who may be a woman, man, or boy of varying experience and ability.

(b) The balance or scale used, which may be sensitive to 1 milligram or 1 gram.

(c) The different waters used, and the temperature of the water. These two conditions go to make the largest variations of any of the disqualifying factors.

(d) The length of time the gluten is washed.

(e) The temperature used in drying, and the length of time the gluten is dried in the drying oven.

(f) In preparing the gluten for the oven, it may be stretched in sheet form, and placed on a card board, and dried at 102 degrees C. The card board previously dried and weighed.

(g) The gluten may be rolled in the shape of a ball, placed on a greased tin plate, and dried for fifteen minutes at 230 degrees C., then for three hours at 102 degrees C. After drying, the gluten is removed from the tin plate and weighed.

(h) The gluten may be stretched in sheet form and placed between two thin sheets of paper, and dried for five hours at 102 degrees C.

The following method was used in washing gluten: To 30 grammes of flour, enough water was added to make a dough of a certain consistency. The dough allowed to stand under water for 1 hour. Washed free from starch, and allowed to stand under water for fifteen minutes, when it was washed a second time, allowed to stand under water for thirty minutes, and dried according to sec. (f).

After drying and weighing, the dried gluten was ground to a powder, and dried at 102 degrees C. for three hours.

The per cent of moisture found in the grinding of forty samples during two months time, varies from 0.50 per cent to 5.0 per cent.

The above method for washing gluten and sec. (g) for drying gluten was used in obtaining the results for table No. 1.

The starch was obtained by the direct acid hydrolysis method. A. O. A. C. Bul. 107.

Table No. 1

Number of Samples used	Flour used	Water used	Alkalinity figured as $CaCO_3$	Average % of D. G.	Starch %
20	65% Patent	Treated Well Water	250 parts per million	11.52	3.6 to 8.3
20	65% Patent	Treated City Water	120 parts per million	10.80	2.0 to 7.5
20	65% Patent	Distilled Water	Neutral	10.50	0.0 to 0.50

An average difference of 1 per cent in dried gluten between the well water and the distilled water was obtained, with the results from the city water between the other two waters.

The variation in the amount of starch found by the direct acid hydrolysis of the dried gluten, was largest with well water and city water, with, you might say, a negative amount with distilled water.

The following table, No. 2, shows the results of dried gluten obtained by two commercial laboratories and myself. All working on the same sample.

The flour used was a 35 per cent clear.

	Lab. No. 1	Lab. No. 2	I-H Lab.
Sample A ----	11.30	11.00	12.70
Sample B ----	12.60	11.40	13.70
Sample C ----	12.30	11.80	13.80
Sample D ----	12.40	11.20	13.80
Sample E ----	12.30	12.00	13.70

The results of the I-H laboratory are much higher than the laboratory No. 1 and laboratory No. 2. The well water treated for boiler use with 250 parts $CaCO_3$ per million was again used in the I-H laboratory.

The other two laboratories used the city water in their respective cities.

These results, which were obtained nearly two years ago, caused us to adopt the Gunning modification of the old Kjeldahl method for the determination of nitrogen.

This method is used in all of our work. Such as analyzing every car of wheat, keeping the mill wheat absolutely uniform, and in reporting the amount of protein in our flour for the use of our customers .

Summary:

(1) The washed gluten method for dried gluten can be checked by using the same water under the same conditions.

(2) The dried gluten method is not reliable out of your own sight.

(3) It is practically impossible to wash gluten absolutely free from starch, without the use of distilled water.

(4) The method is purely mechanical, with a large personal and water factor attached.

(5) The Gunning method for the determination is absolutely reliable, and can be checked any place by any chemist.

(6) The Gunning method for nitrogen is eighty per cent faster than the washed gluten method. Every one knows that time is a great help in an industrial laboratory.

ISMERT-HINCKE LABORATORY,
Kansas City, Mo.

ASSAY OF CHLORINE GAS

Apparatus

Two conical shaped seperatory funnels (100 c. c.) with rubber tubing.

Reagents

Tenth-Normal Solution of Arsenious Acid. Place 4.95 grams of pure resublimed arsenious oxide in a 500 c. c. flask, and add about 25 grams of pure sodium carbonate crystals. Add 250 c. c. of water and place the flask on a water bath until the arsenious oxide is dissolved. Cool and transfer the solution to a liter flask, and fill to the mark with water. One c. c. of this solution is the equivalent of 1.1195 c. c of chlorine at O°C. and 760 mm. pressure.

Tenth-Normal Solution of Iodine. Place 12.7 grams of iodine and 25 grams of potassium iodide in a liter flask with 250 c. c. of water, and agitate until dissolved. Make the solution up to one liter. Adjust the solution with the arsenious oxide solution so that one c. c. of the iodine solution will equal one c. c of the arsenious oxide.

Starch Indicator. Shake one gram of starch with 100 c. c. of water, and heat to boiling. Decant the clear liquid for use. It should be made fresh when wanted.

Solution of sodium hydroxide, 5%.

Process

Determine accurately the capacity of one of the separatory funnels, and then thoroughly dry before filling. Now fill with the gas by leading it through the stop-cock below and displacing the air upward. Dry the chlorine before passing into the funnel by running it through a calcium chloride tube. After the gas has been running for a few minutes, it is safe to assume that all of the air has been replaced. Shut off the gas supply, stopper the funnel and then close the stop-cock. Note the temperature and pressure at this point, and then calculate the quantity of gas taken to O°C. and 760 mm. pressure. Now connect the tip of the funnel by a rubber tube with the other separatory funnel containing 50 c. c. of the solution of sodium hydroxide. Place the funnels at the same level and gradually run the soda solution in. After absorption of the gas, remove the contents of both funnels, and then wash the funnels several times with water. Transfer the solution and washings to a flask and add 100 c. c. of the N-10 arsenious oxide solution and a few drops of phenolphthalein solution. Then add dilute hydrochloric acid until the red color just disappears. Now add a little of the starch solution, then N-10 iodine solution until the blue color appears. Subtract the number of c. c. of iodine solution from the number of c. c. of arsenious oxide solutions added, and this difference multiplied by 1.1195 will give the c. c. of chlorine found at O°C. and 760 mm. pressure. Then calculate the percentage of chlorine.

*If the separatory funnel has a capacity of more than 105 c. c., one additional c. c. of arsenious oxide solution should be added for each c. c. over this amount.

A. R. SASSE.

THE FOOD VALUE OF WHITE AND BROWN BREAD

This investigation was made to ascertain whether brown bread has more nutrition than white bread. The white bread was made from a 100% straight flour which figured 70% of the wheat, and the brown bread was made from a flour or meal which represented 83% of the wheat. They were both milled from the same wheat on an experimental mill.

The analyses were as follows:

	Flour 100% Straight	White Bread from 100% Straight	Meal 83% of Wheat	Brown Bread from Meal
Moisture	12.52%	38.88%	11.96%	39.22%
Ash	00.39%	1.45%	1.29%	2.09%
Protein (N X 5.7)	10.69%	7.10%	11.89%	7.18%
Dry Gluten	10.30%	------	------	-----
Fat	1.05%	2.37%	1.78%	2.87%
Crude Fiber	0.27%	------	1.88%	-----
Carbohydrates	75.08%	------	71.20%	-----
Total Carbohydrates	75.35%	50.20%	73.08%	48.64%
	100.00%	100.00%	100.00%	100.00%
Acidity*	2.50	2.30	4.00	4.80
Food Value (Calories, per lb.)	1634	1166	1655	1158

*Cubic centimeters of N-10 alkali consumed by 10 grams.

It will be noticed in the above analysis that the flour representing 83% of the wheat contains more protein than the 100% straight flour, but the breads made therefrom contain practically the same per cent. This is due to the high acidity in the (83% of wheat) flour which decomposes part of the protein and thereby decreases the food value.

The keeping qualities of the white bread are much better than the brown. The brown bread became moldy one day sooner than the white bread and the mold grew more abundantly upon the brown.

Brown wheat bread possesses laxative properties whereas white bread does not. This is due to the high ash content of the whole wheat flour which contains Phosphates of Calcium, Magnesia, Soda and Potash.

"Calcium phosphate is an essential ingredients of all the tissues and fluids of the body, and forms more than 50% of the bones. Sodium phosphate acts on the blood and on the excretion of urea similarly to the calcium salt. It increases secretion generally, especially that of the bile, being an excellent cholagogue and thereby aiding in the digestion of fats."

Conclusion: The food values of both breads are about the same, but the brown flour has a higher food value than the white flour and this may explain why brown bread is considered by some to have the more food value. As before stated this is not the case because the brown bread loses part of its protein during fermentation.

*Potter's Materia Medica, Pharmacy and Therapeutics.

By A. R. SASSE.

GLUTEN

In the past four months the author has had four requests from as many chemists for information concerning the manner in which gluten is determined and reported on wheat samples. There have also been several samples of wheat submitted by grain dealers and others with requests for gluten reports, their intentions being to compare them with the reports from other laboratories on the same samples.

This has caused me to take notice of this special feature and I would like to call to the attention of the members the great need that exists for a uniform method of reporting the "GLUTEN IN WHEAT." There is a need of uniformity here more than in some other points because of the greater number of persons affected. Trading in wheat is coming more and more to be affected by the gluten value of the sample. Buyers are held to certain standards and so dealers are in turn governed to some extent by the gluten factor.

A few years ago I remember it was considered sufficient to grind, bolt, dough up, and wash out a couple of samples every day or so for several months in the fall and then no more for a year. That was considered enough to get a line on the different classes of wheat. Today many mills test every car that they receive and before the new crop is two months old they have information concerning the character the wheat from each station in their territory.

Therefore, with the gluten value of wheat so important, the dealer is often called upon to supply wheat having a certain per cent of gluten. At this point he often gets angry at the chemists. He may have a report that shows the sample to be "up," the Miller's report shows it to be low. The question is, Who is right? In all probability nobody is wrong so far as figures go, the trouble is that one report gives one man's idea of what gluten in wheat is and the other gives another man's idea. Possibly the dealer is using a report in which total protein, determined on the whole wheat meal and calculated with the factor 6.25, has

been used. The miller has a report wherein gluten is the final result after making a 65 per cent flour of the wheat and using the factor 5.7 in the calculations. Still another might take the same sample, mash it up a little, bolt it on a 32 GG., a 54 silk or a No. 10, which ever was RIGHT according to his particular theory, and wash it in hot or cold tap water or treated water, as his facilities permit.

The result of all of this is CONFUSION, and there is only one way out of it. That is to adopt a method which is right and then everybody use it.

The purpose of this article is to emphasize the need of collaboration among chemists and, to start the ball a-rolling, I will give the method that is used in this laboratory and welcome any criticism.

1st. Take a sample of the milling wheat as it is going to the rolls. (Make a whole meal of this before testing.)

2nd. About an hour later take samples of Straight and Low Grade or such steams as make up the whole of the flour made.

3rd. Make moisture and nitrogen determinations on all the samples taken.

4th. Calculate the total protein of the wheat using 6.25, and the gluten of the flours using 5.7 and reduce these values all to a common moisture content.

5th. Calculate the gluten value of the 100% flour from the results gotten and a knowledge of the percentages of the different grades.

6th. Get the ratio between the gluten of the 100% flour and the total protein of the wheat. That ratio will be the factor that should be used to estimate the gluten value of the wheat when the tests are made on the whole wheat meal and total protein determined.

The factor in use in this laboratory is .830. Thus T. P. x. .830= gluten.

R. WALLACE MITCHELL,
Kansas Milling Co.

ABSTRACTS

Rope in Bread—Origin and Prevention, by Walter Scheppelman, Bakers' Weekly, July 10, 1915.

The Viscosity of Dough, by H. A. Kohman, Bakers' Review, January, 1915.

Bread Dough Fermentation, by George L. Teller, Bakers' Weekly, May 29, 1915.

On the Deficiency in Bread of Certain Mineral Constituents — Henry A. Kohman, Bakers' Review, April, 1915.

Yeast Foods and Sweeting Agents —What their Functions are in Bread Dough, Bakers' Weekly, November 14, 1914, by George L. Teller.

The Official Method for Determining Crude Fiber as Applied to Cottonseed Meal—C. X. Francis, J. Ind. Eng. Chem. 7, 8, p. 676. A comparison of the official method for crude fiber and other modifications. A criticism of the use of linen as the filtering medium, likewise a criticism of the use of asbestos. Hardened filter paper is recommended and F. submits data in support of his claims.

A New and Improved Form of Kjeldahl Distillation Apparatus—Arthur D. Holmes, J. Ind. Eng. Chem. 6, 12, p. 1010. Diagram and the specifications for making an efficient distillation apparatus.

A New and Improved Form of of Kjeldahl Distillation Apparatus —Arthur D. Holmes. J. Ind. Eng. Chem. 7, 8, p. 693. A modification of the apparatus described in a previous article (previous abstract).

Kansas Flours—Chemical, Baking and Storage Tests, Bulletin No. 202, January, 1915. Kansas State Agri-

cultural College, Manhattan, Kan. Describes the methods in use in their laboratory and the apparatus required. Contains data on commercial flours and wheats and baking tests on same as well as tests on mill streams.

Regarding Gluten Tests. George L. Teller, Milling and Grain News, Feb. 10, 1914. Part of a discussion bearing on the value of the washed gluten method and the proper factor to use when the nitrogen method is used.

Producing Popular Loaf. J. E. Wihlfahrt, the Weekly N. W. Miller, July 22, 1914. Discussion of size and style of loaf, ingredients and their effect on the dough and the final loaf. Fermentation and factors that have a bearing on the fermentation. Comparison of the sponge and straight dough system.

Bulletin 178. Kansas State Agricultural College: Gives the effect of carbon disulphide and hydrocyanic gas on the baking qualities of flour when these gases are used as a fumigant in the mill. The conclusion reached is that the bad effects of the fumigants can only be detected by careful measurements and would not be apparent at all in commercial baking.

Bulletin 167. Kansas State Agricultural College: Discusses a quantitative method of determining the hardness of wheat with the idea of giving some method of grading as to its real commercial value better than that now used of simply using the judgment of the operator.

Bulletin 177. Kansas State Agricultural College: Discusses the milling and baking tests of Kansas wheat with particular attention to the relation between the chemical composition of wheat and the baking qualities of flour made from it. Also effects of heat, drying and sprouted wheat on the flour. Tests include about sixty wheats.

Service and Regulatory Announcement, No. 3664: Adulteration and misbranding was alleged on bags of oats which contained 53 per cent oats, 41½ per cent barley and 5½ per cent weed seeds, chaff and hulls.

Service and Regulatory Announcement, No. 3525: Misbranding was alleged because the label showed on bags of cattle feed that the feed contained more protein and fat than was really found on analysis.

Service and Regulatory Announcement, No. 3606: Wheat bran was alleged to be adulterated because it contained screenings and was deleterious to health.

Service and Regulatory Announcement, No. 3642: Reports the seizure of bags of corn chop containing 4.20 per cent sand.

Bulletin No. 34, Bureau of Standards: Reports the use of sodium alizarin sulphonate as a reliable indicator in ammonia titrations and several chemists have recommended it for use in nitrogen determinations. End point is said to be very distinct.

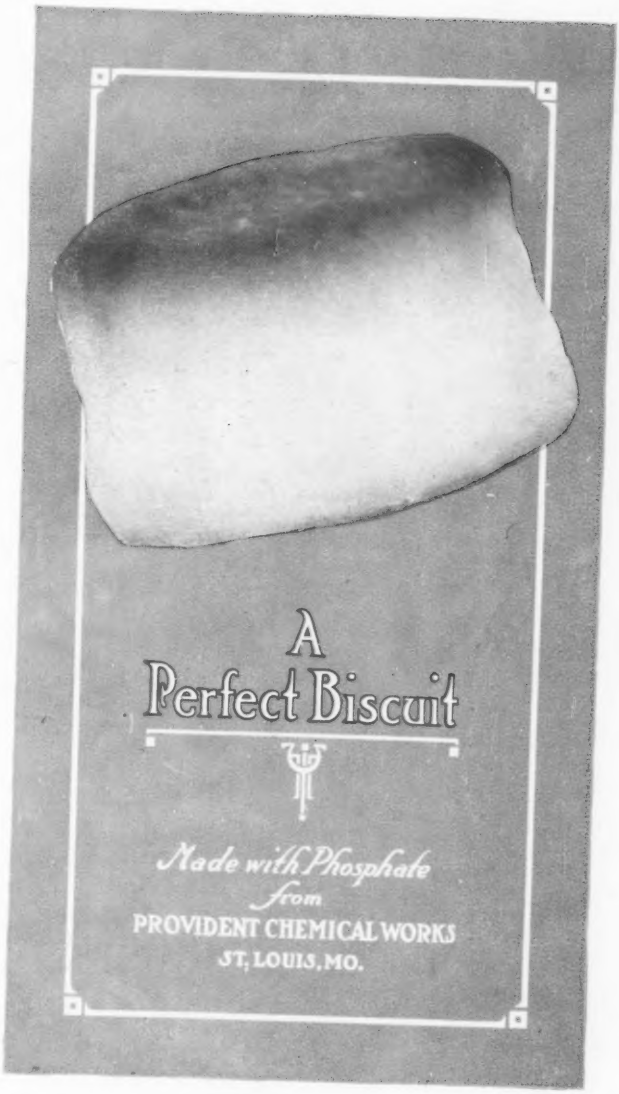
"A RADICAL CLEANER and an IDEAL WHEAT CONDITIONER"

Elaborate investigations and thorough scientific tests proved the Barbeau Wheat Huller to possess those wonderful qualities, which are considered the most essential for the success of the modern mill. Experts call it the last word in the milling industry.

Write for samples of cleaned wheat and circular.

Barbeau Grain Hulling Machine Company

Shawnee Street **DAYTON, OHIO**


A
Perfect Biscuit
Made with Phosphate
from
PROVIDENT CHEMICAL WORKS
ST, LOUIS, MO.

P. C. W. PHOSPHATES

Are the Ideal Leavening Agents
and Make

PERFECT BISCUITS

Prompt Service
Correspondence
Solicited

PROVIDENT CHEMICAL WORKS
ST. LOUIS, MO.

Branches: NEW YORK, CHICAGO, SAN FRANCISCO

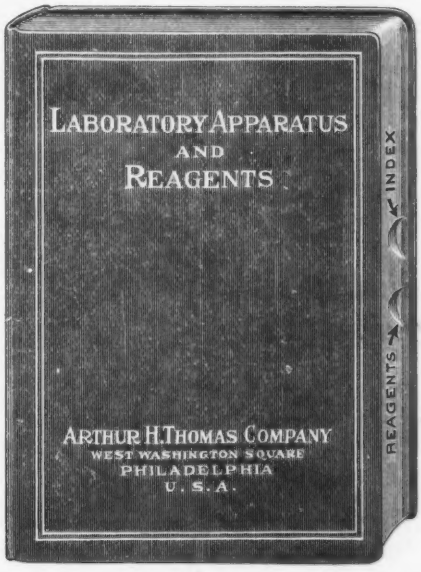
(OVER)

OUR NEW CATALOGUE

IS ENTITLED

LABORATORY APPARATUS AND REAGENTS

selected for Laboratories of Chemisty and Biology in their application to Education, the Industries, Medicine and the Public Health, including some equipment for Metallurgy, Mineralogy, the Testing of Materials and Optical Projection.



It consists of 656 pp., 8x11 1-4 inches in size, bound in serviceable green cloth. The apparatus section comprises 585 pp. on which are listed 12,356 distinct items illustrated with 3,295 illustrations— mostly new wood cuts drawn directly from the apparatus. In the descriptions an attempt has been made to accurately describe the items without the use of superlatives. A Condensed Index with group arrangement faces page 1, and a very comprehensive general Index is provided at the end of the Apparatus section.

In the Reagent section there are listed 2,305 different chemicals with the Certified, Guaranteed and Typical Analysis of Kahlbaum, Merck and Baker printed under all of the more important high-grade chemicals. Prices are given in both original and other size packages with cost of containers clearly shown, and we believe the arrangement affords the buyer an opportunity to make intelligent choice of Reagents on the basis of both quality and price.

We particulary ask a careful reading of the prefatory pages preceding both the Apparatus and Reagent sections, as in these we attempt to outline the range of our business and, to some extent, the principles under which it is conducted.

This catalogue is sent gratis only to those whose identity with regularly established laboratory work is fully known to us. Where we have no information as to such connection, or where it does not exist, a charge of $2.50 is made for the catalogue, which amount is credited against the first $50.00 purchase made therefrom.

ARTHUR H. THOMAS COMPANY

IMPORTERS AND DEALERS

LABORATORY APPARATUS AND REAGENTS

WEST WASHINGTON SQUARE, PHILADELPHIA, PA.

A. W. ESTABROOK

CEREAL CHEMIST

710 WYANDOTTE ST. KANSAS CITY, MO.

For space in the ad department of
this Journal, write to

A. R. SASSE

105 W. 36th St. Kansas City, Mo.

OKLAHOMA LABORATORIES

E. G. WAHLIN, Chemist

GRAIN, FLOUR AND FEED TESTING
OUR ONE SPECIALTY

515-517 INSURANCE BLDG.
PHONE WALNUT 1675

Oklahoma City, Okla.

Cereal and Flour Testing Chemists

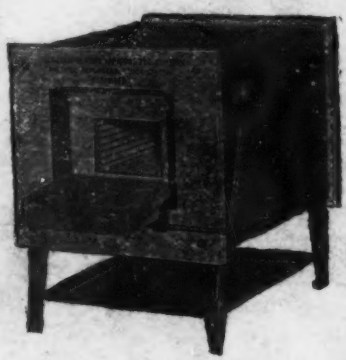
Have Quickly Realized the Advantages of

Electrically Heated Laboratory Appliances

judging from the wide use of these appliances
and the repeat orders received

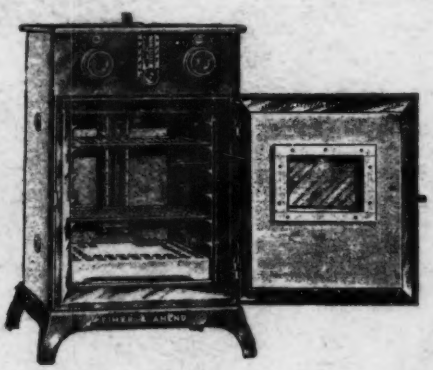
REPLACABLE UNIT ELECTRIC MUFFLE FURNACES and HOT PLATES
FREAS and VARSITY OVENS for constant temperature purposes, etc.
BARNSTEAD ELECTRIC WATER STILLS
GRAMERCY HOT PLATES, Etc.

Their use insures Cleanliness - Cooler Laboratories—Accuracy
and increases the scope of laboratory work.



ELECTRIC MUFFLE FURNACE

Replaceable Unit type. Widely used for Ash determinations and other chemical work.



FREAS ELECTRIC OVEN

Most efficient for Moisture determinations and other purposes requiring an accurate constant temperature.

Write for descriptive literature.

Large stocks always on hand of all Chemical and Bacteriological Supplies required for Industrial and Educational Laboratory purposes.

EIMER AND AMEND

Founded 1851

NEW YORK, N. Y.
205-211 Third Avenue

PITTSBURGH, PA.
3006 Jenkins Arcade Bldg.